



STATE OF WISCONSIN

Department of Safety and Professional Services

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Electrical Program

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2017 Winter Electrical Code Update UDC Electrical Program

1) I have an exterior A/C unit for a dwelling, the nameplate states:

Minimum Circuit Ampacity- 17.9 / Maximum Overcurrent Protective Device- 30 amps

Installed is a 30 ampere breaker w/12 AWG NM-B conductor running to the disconnect at the exterior wall at the A/C. Isn't this required to have a minimum of 10 AWG NM-B conductor on a 30 ampere breaker?

Code reference: NEC 240.4(G), Article 440 Parts III & IV

Answer: No. For A/C installations, the small conductor rules in NEC 240.4(D) do not apply. NEC Table 240.4(G) has specific conductor applications for Air Conditioning equipment. The Table refers us to Article 440 Parts III & IV. NEC 440.22 allows up to a 225% increase in branch circuit device rating for A/C units. The purpose for this is to prevent the circuit from tripping due to the initial inrush current when the unit starts. The A/C nameplate has done all the calculations for us. Continue to use the nameplate to assist with installation & inspections. For Minimum Circuit Ampacity- 17.9, use NEC Table 310.15(B)(16) for conductor sizing. A #12 NM Cable in the 60° column is rated for 20 amps. The #12 NM is acceptable. For Maximum Overcurrent Protective Device- 30 amps, it is ok to put the #12 NM on a 30 amp breaker. Remember NEC 440.22 allows for a 225% increase to take care of the initial inrush. After the initial inrush the circuit ampacity will be at 17.9 amps and the #12 NM cable is acceptable.

2) At a state seminar a while ago, there was a discussion regarding the use of the concrete encased electrode (UFER Ground) when available in one and two family dwellings. The discussion revolved around whether the requirement for a "supplemental" ground, two ground rods in Wisconsin, would be required if the UFER Ground was available on site. At that time, it was determined the only ground connection required was to the UFER Ground. Has this changed since then? I am hearing that various municipalities are requiring the additional two ground rods to the UFER Ground.

Code reference: NEC 250.52(A)(3), 250.53(D)(2)

Answer: No. A concrete encased electrode does not need to be supplemented with any additional electrodes. You are correct. If a concrete encased electrode is present it is required to be used by 250.52(A)(3). The requirement for installing a supplemental electrode is found in 250.53(D)(2) and indicates only a metal underground water pipe is required to be supplemented by another electrode.

3) I am installing a 30 space sub-panel because the main panel is overloaded. Do I need to install AFCI circuit breakers to any of the branch circuits from the subpanel?

Code reference: NEC 210.12(A), SPS 316.210(4)

Answer: Yes, with exemptions. Any new branch circuits added to the sub-panel that are installed for the locations listed in NEC 210.12(A) would require AFCI protection. SPS 316.210(4) deletes the requirements in NEC 210.12(B), and as such, AFCI protection is not required for extensions or modifications of existing branch circuits.

4) A local inspector is requiring an arc fault breaker in a finished laundry room for common receptacles and a washing machine GFI protected receptacle. I see that according to the 2014 changes to the electrical code this is addressed. However, my question is, since this has not yet been adopted, can the municipal inspector enforce this change now and require arc fault breakers, which are more costly?

Code reference: NEC 210.12(A)

Answer: Yes. The inspector is correct and is following our department interpretation of 'similar rooms or areas' as specified in NEC 210.12(A). NEC 210.12(A) contains a non-exclusive list of rooms and similar areas. Branch-Circuits supplying such rooms or similar areas require AFCI protection. A laundry room that is "finished" is similar to a hallway or closet and requires AFCI protection in the State of Wisconsin. Closets are specifically identified in NEC 210.12 and require AFCI protection for all 120-volt, single phase, 15-and 20 Ampere branch circuits supplying outlets. (See definition of outlets in Article 100). AFCI protection is required for all "outlets" in the finished laundry room per NEC 210.12(A) as a similar room/area. Note that NEC 210.12(A) does not apply to unfinished portions of basements where laundry equipment may be located. The 2014 NEC acknowledges that a laundry room is a similar room or area thus the additional language in the 2014 NEC.

5) If it is not the owner's primary resident, can the property owner do the electrical work on remodels and services? Examples: summer home, meter pedestal for a camping trailer out in the woods, hunting shacks, accessory buildings. If so could you please send the codes or administrative rules that apply so I can get into the hands of our inspectors?

Code reference: SS 101.862(4)(a)

Answer: Yes. Wis. Stat. 101.862(4)(a) allows a homeowner to install, repair, or maintain electrical wiring without a license on premises that the property owner owns and occupies unless a license is required by a local ordinance. For example, a homeowner may have to take out a permit but would not need a license to add new lights or receptacles to either new or existing circuits. Note there is no mention that the home has to be the primary residence. Just that the owner occupies the home. For example, an individual may own two homes in Wisconsin and occupy both homes at different times of the year. The person in question could perform their own wiring for the addition to their second home/hunting shack and accessory buildings at the dwelling without a license.

6) I have a situation where the furnace is located inside a closet. This closet has additional mechanical equipment and storage potential. Will this have to be on an arc fault breaker? Please advise.

Code reference: NEC 210.12(A)

Answer: Yes. NEC 210.12(A) requires AFCI protection for all branch circuits installed in dwelling unit closets. Closets are specifically identified in NEC 210.12 and require AFCI protection for all 120-volt, single phase, 15-and 20 Ampere branch circuits supplying outlets. The word outlet is currently defined as any point on the branch circuit you supply power to a receptacle, light fixture, or other type of utilization equipment. (See definition of outlets in Article 100). If the dwelling unit furnace or laundry equipment is located in a closet, AFCI protection is required per NEC 210.12(A).

7) I will be installing a 10 circuit manual transfer switch in a new home. A couple of the circuits that will be controlled through the transfer switch need to be arc-fault protected. The transfer switch that I am planning on using will not provide arc-fault protection on the necessary circuits when under generator power. Is this type of switch allowed? Or, will I need to use a different type of transfer switch with interchangeable circuit breakers to allow AFCI protection under both utility and generator power?

Code reference: NEC 201.12(A)

Answer: No. Yes. NEC 210.12(A) AFCI requirements apply for normal power branch circuits and those on the generator circuits. No exception exists to permit circuits on the generator to omit the AFCI protection requirements.

8) I had a home constructed last year and the electric circuit outlet for a natural gas space heater is protected with a ground fault device like all the other outlets located in the garage. I'm concerned if the ground fault device "trips" my garage could freeze because the unit heater would not be energized. Does the code require a garage heater to be on a dedicated unprotected circuit? I should clarify that this outlet is ceiling mounted at 9'-0" above the finished floor, thus not readily accessible. Does this make a difference? The unit is gas fired and only requires 120-volt service for the fans.

Code reference: NEC 210.8 & NEC Article 100

Answer: No. The NEC requires all 15 & 20 amp 120-volt receptacles installed in the garage to be GFCI protected. No exemptions exist in the code for 120-volt cord & plug connected unit heaters. The code article is NEC 210.8(A)(2). If the unit heater is cord and plug connected, 120-volt, and located in the garage, it is required to be protected by a GFCI device even if on a dedicated circuit. Most unit heaters are 240-volt, and do not require GFCI protection. Unit heaters that are hard-wired (no cord and plug connection) do not require GFCI protection. The height of the receptacle makes no difference with the GFCI requirement. GFCI protection is still required. Beware, new to the NEC is a requirement that GFCI's be installed in readily accessible locations NEC 210.8. All 120-volt receptacles in the garage require GFCI protection and the GFCI shall be installed in readily accessible locations. So while GFCI protection is required, it would not be permitted to install a GFCI 9' above the floor. The GFCI device protecting the unit heater must be readily accessible. Readily accessible is defined in NEC article 100 as:

Accessible, Readily (Readily Accessible). Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, and so forth.

9) What is the requirement when it comes to adding a receptacle when a deck is installed? If designed using Appendix B, a receptacle may be required, but if following the provisions of SPS 321.225(1)(a) thru (f) it would not be required? That doesn't seem right? We've been asked this question by a deck builder and would like clarification on how to address this? Would this include decks that are being built on an existing home?

Code reference: NEC 210.52(E)(3)

Answer: To be code compliant, decks that are accessible from inside the dwelling unit must have at least one receptacle installed as required by NEC 210.52(E)(3). Yes, this includes decks built on an existing home. This code requirement is not retroactive. So it could be applied at the time a new deck is installed on an existing house. It could not be applied when a deck was "repaired". A "repair" is normally taken as a 1:1 replacement without alteration so this might vary from project to project.

10) Obviously we know the UDC, SPS 321.09 (2) requires a building with electric service to have alarms continuously powered by the house service and interconnected. At the time the code rule was written I bet there weren't any wireless detectors around for residential use so we logically assumed that meant hard wired. But possibly the word interconnected could mean wireless interconnected. This product, Nest, is hard wired and has battery backup but doesn't have a hard wire to interconnect the system. It is a wireless interconnect system. Do you know if this system is acceptable in the state of Wisconsin? I would appreciate any information you could pass on.

Code reference: SPS 321.09

Answer: Yes. For new construction, or remodel projects that require the installation of CO and Smoke alarms, the units must be hardwired, but the interconnection can be achieved using wireless technology. All alarms must be audible; therefore, each unit must have an audible alarm. All units must be interconnected.

11) I am building a new hunting cabin on my property. There are no structures, electric, or plumbing on the property. I am only using it during deer season, and maybe a couple of other weekends a year. I will be staying there overnight. Can I the owner do the electrical work or do I need a licensed electrician?

Code reference: SS 101.862(4) (a)

Answer: No. You need a licensed electrician. In this case the building is under construction, and the owner does not occupy the building. Until the owner occupies the building, 101.862(4)(a) does not apply.

12) We moved our house from one location to a new location and built the foundation under the house. We are having an electrician place the panel back onto the wall in the basement. The problem is

the old basement only had 8' walls and the new foundation is 9', which makes the panel height over the 6 1/2 feet because of the length of the wires that were previously in it. The electrician thinks that we can just build a 3' x 3' platform with a step up, so the height is less than 6 1/2 feet. Both the electrician and I tried to find a code for this. We couldn't find anything other than you have to have 30" wide and 36" front clearance for the panel. Can you direct me to the code that pertains to this information, so I know that it is correct before inspection and also have the information to back up what we do?

Code reference: NEC 240.24(A) & 404.8

Answer: Yes. The height requirements for panels/overcurrent devices are located in the 2011 NEC, under 240.24(A) Accessibility, and 404.8(A) Accessibility and Grouping Location. The electrician is correct that building a 3' x 3' working platform will solve the working height issues and the working clearance issues per NEC 110.26.

13) I have a question about an over-under two story duplex service. The upper unit SER cable feeding the panel will be approximately 60 feet long, running interior of the building. I was going to use a Milbank double meter socket with main breakers. The units are six weeks out and I don't have the time to wait. What I would like to do is install a double meter socket and attach a disconnect next to the meter for the upper apartment. The question is, do I need to put a disconnect on the outside of the building for the lower unit? I plan on putting the panel with the main breaker directly behind the meter. I will penetrate the structure with about 5 feet of conductor.

Code reference: NEC 230.72, 230.2, 230.40 Exception No. 4.

Answer: No. According to NEC 230.72 the disconnects either have to be grouped or in or on the unit. You would not be allowed to install the disconnect on the outside of the lower unit for the upper unit. Only one service shall supply the duplex according to NEC 230.2, from which a set of service entrance cables is permitted to run to each occupancy by NEC 230.40 Exception No. 4.

14) I have a resident who is pulling some permits for a finished basement after the work has been completed. They hired an electrician to open all the junction boxes, do load calculations on the branch lighting circuits and just basically make sure everything was installed to code. The only item that seems to be an issue is the dedicated bathroom circuit. It's on a 15 amp breaker with 14 AWG wire. In your opinion would you make them install a 20 amp dedicated circuit to the bathroom receptacle?

Code reference: SPS 316.003(3), NEC 210.11(C)(3)

Answer: Yes, unless it was grandfathered. I would attempt to verify when the basement was wired. NM Romex may have a production date on the cable to assist you. The bathroom receptacle has been required to be supplied by a minimum 20-ampere branch circuit since the 1996 NEC, 20 years ago. We would not consider the installation as grandfathered if the code did not permit the wiring to be installed on a 15-ampere 14 AWG branch circuit at the time of wiring.

15) A bath remodel is proposing to install a TV in a bathroom for the individual using the tub. Is the location of the TV subject to any distance clearances to the tub similar to the distances in 410.10(D) for

luminaires near a tub or a receptacle for indoor spaces as in 680.43? I can't quickly find a code section that identifies any required clearances in this situation. It seems logical there would be a required clearance given 680.43 requires receptacles be located no closer than 3' horizontally from an indoor spa or hot tub. The intent being to keep a person who is standing or immersed in a body of water from reaching a cord connected appliance, even if it is plugged into a GFCI receptacle.

Code reference: NEC 406.9

Answer: No. The code does not have any specific requirements in regards to TV locations in bathrooms. The customer should be made aware of the hazards involved in case that GFCI may fail. The code does have specific requirements in regards to receptacle locations and specifically, NEC 406.9 Receptacles in Damp or Wet Locations. (C) Bath and Shower Space. Receptacles shall not be installed within or directly over a bathtub or shower stall.

16) In a residential construction, Romex is running in an attached garage and the ceiling and house wall are sheet rocked for fire rating. The side walls of the garage are uncovered, and Romex is running thru studs to outlet boxes. SPS 316.334(2) allows NM without a wall covering. Also, NEC 334.10(A)(1) allows NM to be exposed with exception overruled by SPS 316. At what point does NEC 334.15(B), protection against physical damage, come into play? Again, this is a residential attached garage with Romex running thru studs inside walls.

Code reference: NEC 334.15

Answer: Yes. You are correct that SPS 316.334(1) substitutes the language found in NEC 334.10(3) by eliminating the requirement that the cables must be concealed with at least a 15 minute barrier. In Wisconsin, the cable is permitted to be exposed but shall also be protected from physical damage. NEC 334.15(A)-(C) has requirements that must be followed for NM cable in exposed locations. The rules in NEC 334.15(A)-(C) have not been amended in Wisconsin and shall be followed. Our group consensus is that NM installed exposed horizontal through studs below the skirt and in side walls in an unfinished garage is subjected to physical damage and shall be protected per the NEC requirements. The State consensus is that NM installed exposed and parallel to the framing members like studs, joists, etc. is sufficiently protected where properly secured and supported. Site conditions also come into play with physical damage & NM cable. We respect the decision made by an AHJ based on a case by case basis.

17) Were electrical panels allowed in residential bathrooms in 1987? I don't have an archive going back that far.

Code reference: NEC 240.24(E)

Answer: Yes. Section 240.24(E) was introduced in the 1993 NEC. The section prohibits dwelling unit overcurrent devices from being located in bathrooms. Prior to the 1993 NEC the installation was permitted. SPS 316.003 permits the installation prior to 1993 as grandfathered. Please note that if the owner wants to add any new overcurrent devices to the installation, a violation would be created. No

new overcurrent devices shall be installed in the grandfathered panel. New overcurrent devices shall comply with current code requirements found in NEC 240.24.

18) Does the state require inspections of all residential electrical services, or only services on new home construction?

Code reference: SPS 320.04(1), SPS 320.10, and SPS 316.940

Answer: No and Yes. SPS 320 only requires inspections of new one and two family dwellings per SPS 320.04(1) and SPS 320.10. Municipalities may require permits and inspections for additions and alterations, but they are not required to do so. SPS 316.950 requires that the utility obtain proof that the electrical wiring complies with SPS 316 before connecting electrical service. This can be a certificate filed by an authorized inspector, or a written affidavit filed by the electrical contractor or electrician.

19) I have a question regarding outlets for kitchen counter tops. I recently did some work in a residential kitchen, where the owner replaced the existing kitchen cabinets and counter tops with new ones. The existing layout of outlets did not meet the current code standard 2ft-4ft rules for kitchen counter tops, but since the walls were not opened or "down to the studs" I just replaced the existing outlets for the counter top to GFI and tamper resistant. The inspector now wants to meet the 2 ft.-4 ft. rules. For the last 16 years I have run into remodels like this. Over the years all local inspectors I have spoken with have stated that updating to the 2ft- 4ft is only required if changing the cabinet layout or going down to bare studs. Our company has also had numerous discussions over the years with the state and this has always been the ruling as well. Another municipality stated recently that updating to the 2ft- 4ft rule is only needed with cabinet layout change or 50% of drywall or plaster removed. Has this rule changed and if so when and why has it not been alerted to contractors?

Code reference: SPS 316.003

Answer: No. The rules have not changed. If the drywall is not removed and the cabinet layout stays the same and the existing installation was inspected and approved when first installed, updating the kitchen to 2011 NEC/SPS 316 is not required.

SPS 316.003 reads:

EXISTING INSTALLATIONS. Existing electrical installations shall conform to the electrical code that applied when the installations were installed. An existing electrical installation may be required to be brought into compliance with the current code's requirements by the department and within the time period determined by the department when a hazard to life, health or property exists or is created by the installation.

Replacing the kitchen cabinets does not trigger compliance with the 2011 NEC or SPS 316.

20) Could you please forward the State's position on NEC article 225.39(D)? In a detached garage does this article state the rating requirement for the entire feeder or just the feeder disconnect? The inspection report is stating that the feeder must be rated for 60 amperes.

Code reference: NEC 225.39(D)

Answer: NEC 225.39 requires the disconnecting means to be not less the calculated load and in no case less than (A) thru (D). NEC 225.5 indicates the size of the conductors shall be based on loads as determined under 220.10 and Part III of Art. 220. While 230.42(B) requires service conductors to be not less than the service disconnecting means we see no similar language in Art. 225. The outside feeder conductors can be sized and protected to meet 310.15 for the load to be served and the disconnecting means would need to meet 225.39(a)-(d).

21) Can a cable marked Type USE-2, RHH, RHW, or RHW-2 GR2 SUN-RES DIR-BUR VW-1 FT4 600V XLPE for CT USE (UL) be used for interior use, between the electric meter and the main disconnect in the panel in the house? NEC 338.12 (B) states that USE cannot be used for interior wiring.

Code reference: NEC Table 310.104(A), UL White Book page 596, NEC 310.10

Answer: The cable has a dual rating, Type USE-2 is not rated to be installed indoors because it does not have a flame-retardant insulation to stop the spread of fire. RHW and RHW-2 do have a flame-retardant insulation so these can be installed indoors.

22) I did an electrical service inspection for a single family home this morning. The rough roof is on with no shingles over the area where the service panel is located in the basement and it was covered with Tyvek. However, it rained last night and the panel is soaking wet inside. Should the entire panel be replaced or just the breakers and main disconnect? Or should the entire panel be replaced? Is there a code section that addresses this situation?

Code reference: NEC 110.28 SPS 316.009/316.010, NEC 110.3 (B), 110.12 (B), 300.6 and/or 312.2

Answer: Maybe. You stated that the service panel was covered. NEC 110.28 requires the enclosure to be marked according to Table 110.8, if it was not, then this is a violation. Also, you may use SPS 316.009/316.010, NEC 110.3 (B), 110.12 (B), 300.6 and/or 312.2 to make a determination if the entire panel or only the components should be replaced. The following link can be helpful to you in evaluating electrical equipment subject to water damage. You may use this resource to assist you with compliance in evaluating water damaged electrical equipment on your inspections.

23) I've seen a lot of neat ideas on Pinterest for DIY light fixtures. We're getting ready to finish our unfinished basement and I would like to make some light fixtures similar to what I've seen online. What are the requirements? It obviously won't be UL listed, but does combining UL listed components meet Wisconsin code? Does the voltage (12V vs. 120V) make a difference in how the code is viewed?

Code reference: SPS 316.110 & 410.6

Answer: NEC 410.6 requires light fixtures to be listed. This covers normal 120 volt fixtures. NEC 411.3(A)&(B) both deal with lighting systems operating at 30 volts or less, and indicates that the complete system shall be listed, or assembled of listed parts, including the light fixture, power supply, light fixture fittings, cords, and cables. A light fixture is UL listed as it comes from the factory. If you plan on dressing up a light fixture, you would now be voiding the UL listing of the light. Be careful on

what you do. As far as the 30 volts or less, you can assemble something as long as the parts are UL listed as a complete system.

24) I am buying another property, second home or maybe I will rent it out. It needs a lot of work. I will be gutting the home before I stay there, can I do the work or do I need a licensed electrician?

Code reference: SS 101.862(4) (a)

Answer: No. The owner does not occupy the building, the exemption in 101.862(4)(a) does not apply. A licensed electrician is needed.

25) Is NM Romex run down the surface of a finished wall wood, concrete, etc. in an unfinished basement required to be sleeved for physical protection? Or is this following the building finish? What's the State's opinion? I've always required something like this to be in a raceway.

Code reference: NEC 334.15(B)

Answer: Yes. The State's consensus is that NM Cable installed unprotected below the joists of the basement is subject to physical damage and shall be protected per NEC 334.15(B).

26) This is an old topic, but could you clarify? The manufacturer says the product, Counterstrike by Trac Pipe needs no additional bonding. Does this mean that its acceptable to bond the gas piping with the circuit that is likely to energize the gas piping per 250.104(b)? Or should we just play this safe and make them bond all CSST regardless of type with a #6 copper conductor? Basically, there are differing opinions in the office and we would like to all be consistent.

Code reference: NEC 250.104(B)

Answer: Not necessarily. Several CSST tubing manufactures exist, each with unique required method's for properly grounding the tubing. Some CSST products do not even require bonding. Follow the CSST manufacture's installation instructions for proper bonding requirements. Counterstrike CSST requires no additional bonding other than those requirements found in NEC 250.104(B). The equipment grounding conductor of the circuit that serves the furnace (water heater, etc.) is sufficient for bonding the CSST.

27) When wiring a "three season room" which will have no permanent heat source. Are we required to install receptacles to meet the 6'-12' rule?

Code reference: NEC 210.52

Answer: Yes. 210.52(A) gives us a list of rooms in a dwelling unit that are required to have receptacles installed to meet the requirements of 210.52(A)(1) thru (A)(3). One of them is a sunroom which I would consider similar to a "three season room" if it has permanent glazing. There is no requirement for a heating source for it to be considered a habitable room. If the room is attached to a home with access from the interior, is considered to be a dry location, and is large enough to reasonably assume it will have furniture and cord and plugged appliances, such as a television I would require receptacles to be

installed to meet the 6'-12' rule. Also, 210.70 requires a switched interior lighting outlet and a light on the exterior of any outdoor entrance.

28) I did a final inspection of a new home wired by a contractor rather new to our community. I asked him to go back to fix the receptacle box under the dishwasher, and add a breaker lock for the disconnecting means requirement. He stated he'd never heard of that, for a dishwasher, he floats a box and considers that the disconnect means in conjunction with cord-and-plug. Is this allowed?

Code reference: NEC314.23

Answer: No. Boxes are required to be securely fastened in place. Floating boxes have never been permitted on account of 314.23. The cord-and plug is a legitimate disconnecting means per 422.16(B)(2). Last but not least, a breaker lock is permitted as the disconnecting means for a nonmotor operated appliance per 422.31(B). For motor operated appliances, with motor HP greater than 1/8, follow 422.32. In other words, the disconnect must be within sight of the appliance because that's where the motor controller is normally located.

29) A customer is finishing part of the basement in her new home into a family room and bathroom. The service panel is going to end up in the bathroom. We will have the required working clearances, and it's really only a ½ bath, no shower or tub so I don't think it will be a problem. What do you think?

Code reference: NEC Art. 100, 240.24(E)

Answer: It's a problem. The definition of a bathroom in Art. 100 indicates if it has a basin and one or more of the following: toilet, bathtub, or shower, then it is a bathroom. NEC 240.24(E) does not allow overcurrent devices in a dwelling bathroom.

30) We are starting to see more instantaneous water heaters being installed. My question is do we need to look at these as a continuous load when doing our load calculations?

Code reference: NEC 422.13 and Article 100 Definition

Answer: No. This is an instantaneous water heater, not a storage type water heater. Thus, 422.13 does not apply. NEC 422.13 indicates a storage type water heater of 120 gal. or less shall be considered for continuous load when sizing circuits. Article 100 defines a continuous load as when the maximum current is expected to continue for 3 hours or more. Typically an instantaneous electric water heater would not be in use continuously for 3 hours or more.

31) I installed a 20 amp circuit in the kitchen to supply the garbage disposal and the dishwasher. The inspector rejected it. The dishwasher was rated 12 amperes. The garbage disposal was 1/3 hp and the nameplate says 5.6 amperes. Are both appliances permitted on the same circuit?

Code reference: NEC 422.10, NEC 210.23, NEC 430.6(A)(1) Exception No. 3

Answer: Yes. NEC 422.10 indicates the rating of a branch circuit supplying two or more appliances shall meet NEC 210.23. NEC 210.23 Permissible Loads indicates *"in no case shall the load exceed the branch-*

circuit ampere rating". NEC 210.23(A) (1) & (2) do not apply since both are fastened in place. The total load is 17.6 amperes, so it does not exceed the branch circuit ampere rating, and both appliances are allowed on the same circuit. The ampere rating of listed motor-operated appliances is the nameplate rating regardless of horsepower.

32) I have been asked to install a 20 KW generator at a single family dwelling. I plan to install a manual transfer switch between a 200 amp circuit breaker in the meter pedestal and the 200 amp panelboard. Is this arrangement permitted?

Code reference: NEC 702.4(B)(1) & (2)

Answer: Yes. If a manual transfer switch is used, the user of the system is permitted to load shed. If an automatic transfer switch is used, the system has to be capable of supplying the full load, or automatically shed loads down to system capacity.

33) In the master bathroom there are two receptacle outlets installed inside cabinets on both sides of the sink. NEC 210.52(D) requires the receptacle outlet to be adjacent to the basin. Are these receptacle outlets considered adjacent to the basin per 210.52(D), even though they are within cabinets? They are within 3' of the basin. You would assume a person would not close the cabinet doors on the cords, but you never know.

Code reference: NEC 210.52

Answer: Yes. NEC 210.52 specifies the requirements for the receptacle placement in the bathroom. As long as the requirements are met, placement in the cabinets would meet the current intent of the code. There is no language in NEC 210.52(D) to prohibit receptacles within cabinets. Just treat the back wall of the cabinet as the wall itself. In kitchens this is done all the time for over the range microwave/hoods, for under the sink receptacles for disposals and/or dishwashers and/or instant hot water devices, etc. The installation is becoming more common with today's modern bathroom cabinets.

34) When installing NM cable above a drop ceiling per SPS 316.334 in a dwelling unit is it permissible to allow the cables to be secured to the bottom of joists? I have enforced the running board requirement in NEC 334.15 (A) as being above the ceiling, then it is still exposed. I have 2 contractors questioning my interpretation on this.

Code reference: NEC 334.15(A)(B)(C)

Answer: No. NM cables above an accessible drop ceiling are considered exposed. It is not permissible to allow the cables to be secured to the bottom of joists without the additional protection requirements in NEC 334.15(A)(B)(C). NEC article 100 definition of exposed is helpful when enforcing NEC 334.15. It reads:

Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access.

Panels designed to allow access refer to accessible drop ceilings.

35) We have a two-family occupancy building that we are working on and the customer is questioning the requirement of a “house panel & meter” for the common area lighting and power. We think that it is required by NEC 210.25 (B) and we don’t see anything in SPS 316 that would lead us to believe otherwise. Could you clarify this for us?

Code reference: NEC 210.25(B)

Answer: Yes. A house panel for the common areas is required for new installations by 210.25(B). The language was added in the 1996 NEC, so installations before that would be “grandfathered” and are not required to be brought up to current code unless new common area branch circuits were added.

36) I am inspecting a duplex being built in a rural area. Each side of the duplex will be rented to a non-owner. It is in the country, so only one well will be drilled. Both units will share the well, but the electricity from the well pump will be provided by one of the individual panels. I seem to recall when there is a situation where there is shared or common usage of electricity that a “house meter and panel” must be installed. I can’t seem to find that in the electrical code. Is that a DATCP rule or utility rule or not required?

Code reference: NEC 210.25(B), PSC 113.0802(3) (3)

Answer: No. It is required by NEC 210.25(B) and PSC. The metering and wiring in nontransient, multi-dwelling-unit residential buildings, mobile home parks and commercial establishments where individual unit metering is provided, or required under the provisions of PSC 113.0803, shall be installed or arranged so that each customer or tenant is metered for his or her own consumption only. Energy used by common area loads, for example, hallway lighting and heating, shall be separately metered and billed as appropriate under the utility's filed tariff.

37) I will be rewiring the second floor of a duplex. Can I have EMT conduit run on the floor of a walk-up attic to feed all new receptacles and lighting outlets?

Code reference: NEC 358.10

Answer: Yes. My question to you is how much traffic will be in the attic after installation of the raceways? The attic area should not be subject to severe physical damage. It may have some foot traffic and maybe a box or two set on top of the pipe.

NEC 358.10 Uses Permitted (A) Exposed and Concealed. The use of EMT shall be permitted for both exposed and concealed work. 358.12 Uses Not Permitted. EMT shall not be used under the following conditions: (1) Where, during installation or afterward, it will be subject to severe physical damage.

38) Increasingly insulating contractors are trying to seal receptacle and switch device boxes with the expandable spray foam vs. silicone caulk. While this may be faster and easier for the installers, it raises a question, is this material acceptable for sealing the device boxes when applied to the wire openings

from the inside of the box? The foam typically results in excess foam projecting into the box and perhaps making contact with the receptacles and switches. Doesn't the sealing of the box ultimately become compromised when electricians remove excess foam to make room for the wires, switches and receptacles?

Code reference: SPS 316.110

Answer: No. Yes. An electrical box shall not contain any spray foam or any kind of insulation. The electrical code specifies the minimum volume of electrical boxes to be sure that there is enough air around the conductors to dissipate heat. Any interference with a conductor's ability to dissipate heat can create a fire hazard. Any type of caulking or fire stopping used around electrical equipment should be listed or labeled for use according to SPS 316.110.

39) Attached is a wiring diagram for a thermostat. This diagram is out of the Owner's Guide. This unit is listed as a 120/240V unit. None of us here think that switching only one leg of the 240 V circuit and leaving the other leg continuously powered is safe. We can't find any code that says this is incorrect. In your expertise is this safe and code compliant?

Code reference: NEC 424.20

Answer: Yes. NEC 424.20(B) addresses the question that you have. Read through (A) then through (B). *424.20 Thermostatically Controlled Switching Devices.*

(A) Serving as Both Controllers and Disconnecting Means. Thermostatically controlled switching devices and combination thermostats and manually controlled switches shall be permitted to serve as both controllers and disconnecting means, provided they meet all of the following conditions:

(1) Provided with a marked "off" position

(2) Directly open all ungrounded conductors when manually placed in the "off" position

(3) Designed so that the circuit cannot be energized automatically after the device has been manually placed in the "off" position

(4) Located as specified in 424.19

(B) Thermostats That Do Not Directly Interrupt All Ungrounded Conductors. Thermostats that do not directly interrupt all ungrounded conductors and thermostats that operate remote-control circuits shall not be required to meet the requirements of 424.20(A). These devices shall not be permitted as the disconnecting means.

As you can see the thermostat is allowed to open one leg of the circuit. It is acting as a controller. When you use this method, the thermostat is not considered to be the disconnecting means, so a breaker lock or other type of disconnect would be required on the circuit feeding the heater.

40) I have a home owner that is adding onto his house and wants to install a subpanel in the room. It's a sun room addition. He wants to know, can the disconnect for the subpanel be in the form of a breaker in the subpanel? NEC 225.38 doesn't seem to allow for this type of disconnect. Also, for grounding purposes, this subpanel is within the main building. He doesn't need to use a ground rod, but he does need to ground back to the main panel per 408.40. Do I understand that correctly?

Code reference: NEC 215, 408.36(D), 250.122, 408.40

Answer: Not necessary. Yes. The NEC Article that you need to reference is 215 Feeders. It sounds like the subpanel is inside the existing house in a sunroom. If so, the sub-panel would not be required to have a disconnecting means in it. If the owner wants a disconnect he can use a breaker as the disconnecting means. If the breaker is being back-fed it is required to have a device to secure the breaker to the load center according to NEC 408.36(D). As far as the ground wire, that will be carried with the feeder conductors and must be sized per NEC 250.122. He does have to ground back to the main panel as you had mentioned per NEC 408.40. The equipment grounding conductors shall not be connected to a terminal bar provided for grounded conductors.

41) Can you use 15 amp rated receptacles on a 20 amp circuit?

Code reference: NEC Table 210.21(B)(3)

Answer: Yes. Refer to NEC Table 210.21(B)(3). It shows you can use a 15-amp outlet on a 20-amp circuit if more than one outlet, such as a duplex is used.

Table 210.21(B)(2) Maximum Cord-and-Plug-Connected Load to Receptacle		
Circuit Rating (Amperes)	Receptacle Rating (Amperes)	Maximum Load (Amperes)
15 or 20	15	12
20	20	16
30	30	24

42) I have a question regarding credentialing and I thought I would start with "the answer guys." If a person has his/her Residential Journeymen card, can they work on commercial projects?

Code reference: SPS 305.40(2)(b)

Answer: Yes. Refer to SPS 305.40(2)(b) Electricians. They can work on commercial projects as long as they are under the direct supervision of a Master, Registered Master or Journeyman Electrician.

43) Can a detached garage or outbuilding have two separate feeds coming to it? I have an owner of a duplex that has a 3 car garage. He would like two of the garage units to be fed from the lower and one from the upper. Two master electricians have said no, and one inspector has said yes as long as there are two disconnects that are grouped together. What is the answer, please?

Code reference: SPS 316.225 2(B)

Answer: Yes. SPS 316.225 2(B) permits a single branch circuit to be run from the tenant's panel to each respective space. The disconnect for each branch circuit may be a snap switch per NEC 225.36 Exception. The disconnect for the branch circuit may be in the space and shall be located per NEC 225.32. The identification requirement of NEC 225.37 applies.

44) There is a 50 year old house that is located in the floodplain. The house is not flood proofed, and the electric panel is in the basement. They are upgrading the service from 100 amps to 200 amps. At a minimum can I require that a disconnect be installed outside, two feet above base flood elevation? I do not believe that they would be willing to relocate the electric panel to the upper floor. Wisconsin Public Service, the utility company, said that they do not have any requirements for this. There is a lot of information on the FEMA website, but it appears that it may only pertain to new construction.

Code reference: None.

Answer: The NEC is silent on the issue for dwelling unit panels. The only requirements for avoiding a flood plain are for emergency systems in commercial industry facilities. You could strongly encourage the customer to relocate based on the history and location. The final decision on location would rest with the customer.

45) There has been some discussion if the conductor ampacity adjustment factors located in the 2011 NEC 310.15(b)(3)(a), and not applied to an "individual dwelling unit" (SPS 316.310) would also apply to the use of nipples. The reason for the discussion is that a nipple by definition is not a raceway, (NEC 310.15 specifies cables and raceways) and already has an increased conductor fill allowed. An example of the application (or misapplication) of this section would be a service change where the existing enclosure does not meet 110.26 clearance requirements and now becomes a junction box. A nipple to connect the branch circuits from the relocated service panel, could conceivably be filled to 100% capacity if the SPS316.310 were followed. You can see where the misapplication of this article could lead to some discussion.

Code reference: Note 4 to the Chapter 9

Answer: The NEC does not define "nipple", and we would consider it a short raceway, less than 24 inches. While SPS 316.310 indicates that the ampacity adjustment rules don't apply to individual dwelling units, Note 4 to the Chapter 9 tables restricts short raceways from being filled to more than 60 percent of their capacity in any case.

46) A recessed lighting fixture is above the shower with an 8 foot ceiling. What should the listing be with a standard shower head? Wet or damp? And, if the shower head is on a wand, does this change?

Code reference: NEC 410.10(a)&(d)

Answer: The NEC requirement is found in NEC 410.10(a)&(d). It reads:

Wet and Damp Locations. Luminaires installed in wet or damp locations shall be installed such that water cannot enter or accumulate in wiring compartments, lampholders, or other electrical parts. All luminaires installed in wet locations shall be marked, "Suitable for Wet Locations." All luminaires installed in damp locations shall be marked "Suitable for Wet Locations" or "Suitable for Damp Locations."

Luminaires located within the actual outside dimension of the bathtub or shower to a height of 2.5 m (8 ft) vertically from the top of the bathtub rim or shower threshold shall be marked for damp locations, or marked for wet locations where subject to shower spray.

The recessed trim is typically used to make the recessed luminaire listed for the location. I am unaware of a recessed fixture being listed for a wet/damp location (use the trim to comply with the listing). The trim at a minimum shall be listed for damp locations. If subjected to shower spray (shower head on a wand) the trim shall be listed for a wet location.

47) I installed a single receptacle behind a dishwasher and cord and plug connected the unit. The inspector said at inspection that I must have a switch disconnecting the outlet either above or inside the adjacent cabinet or move the single receptacle to under the adjacent cabinet and pass the cord through and plug it in. As I read code article 422.16 (B) (2) 1-5 I have followed the code correctly. I installed a single receptacle behind the dishwasher and cord and plug connected it. I read it as being accessible and the definition of accessible as stated under definitions as "capable of being removed or exposed without damaging the building structure or finish and not permanently closed in by the structure or finish of the building".

Code reference: NEC 422.16(B)2 & 4, 422.33(A)

Answer: You are correct. We consider the receptacle that is in the dishwasher space to be accessible. Dishwashers are allowed to be cord and plug in accordance with 422.16(B)(2) and 422.16(B)(2)(4) requires the receptacle to be located in the dishwasher space or in the adjacent cabinet. 422.33(A) allows the plug and receptacle to serve as the disconnecting means. Your installation is compliant.

48) The carpenter is taking out all of the cabinets, and drywall in a bathroom and reworking some of the walls. Am I correct in telling him that the wiring has to be brought up to the current electrical code before he puts the drywall back on? This is a 1968 year ranch home and the bathrooms are all on the same circuits with bedrooms in the house. The bathroom receptacles are also on a 15 amp general lighting circuit at this time. I am assuming that it has to be rewired but I want to make sure.

Code reference: SPS 316.003(3), NEC 406.4(D)(3)

Answer: No. Not necessarily. The removal of drywall does not trigger a requirement to bring the existing wiring up to current codes if it was code compliant at the time it was first installed. Any new wiring would need to meet current codes. GFCI protection would have to be provided for any receptacles that are replaced per 406.4(D)(3).

49) I recently did a footing inspection where the complete footing area was located on solid rock. Under NEC 250.52 (3) there's language in the code that references "direct contact with the earth", by definition, is a rock ledge considered earth? We are located close to a tri -state area and the concrete contractor advised me Iowa will not allow the concrete encased grounding electrodes to be located on top of rock in a footing. Can you please advise Wisconsin's opinion on a situation like this? Is there another method to use when encountering soil conditions like this?

Code reference: NEC 250.52(3)(2)

Answer: Yes. Your question was such an interesting question, that it was brought to our weekly meeting. After an extensive discussion, the state inspectors agreed that the concrete encased electrode in this situation is in direct contact with earth, supplemental rods are not needed. Also, I would like to direct your attention to the informational note below NEC 250.52(3)(2) that specifies what is considered not to be in "direct contact" with earth:

Concrete installed with insulation, vapor barriers, films or similar items separating the concrete from the earth is not considered to be in "direct contact" with the earth.

50) How many NM cables can be under a white manufactured plastic staple? One or two? Do NM cables need to be attached to a multigang NM box and secured within 12 inches of the box? How many cables can be installed in one hole of an NM multigang box?

Code reference: NEC 334.30

Answer: The NEC does not specify the number of NM cables under a staple. Some staples are listed to hold one cable and some are listed to hold two. You would need to refer to the manufacturer's instructions. In answer to your second question, you are correct NM cables must be secured and supported according to NEC 334.30. Lastly, you would need to refer to the manufacturer's instructions for information on the number of cables installed in one opening of a device box.

51) I am inquiring about caulking in a garage. Is there any code building or electrical that requires the caulking of holes in the garage? We do caulk all holes and boxes on the common wall but we have been bounced twice for not caulking in the garage.

Code reference: NEC 300.21, SPS 321.08(1)(a), SPS 321.08(3)(b)

Answer: Yes. The NEC only requires fire-rated floors, ceilings, and walls be fire stopped so that our wiring methods through the area will not contribute to the spread of fire or the products of combustion. If the area in the garage has a fire-rated wall, floor, or ceiling NEC 300.21 applies. This may apply in an attached garage wall that separates the garage to the dwelling. This would not apply to a detached residential garage.

NEC 300.21 addresses the requirement. It reads:

300.21 Spread of Fire or Products of Combustion. Electrical installations in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations into or through fire-resistant-rated walls, partitions, floors, or ceilings shall be fire-stopped using approved methods to maintain the fire resistance rating.

321.08(1)(a) addresses fire separation in the UDC between and attached garage and the dwelling. SPS 321.08(3)(b) specifically addresses penetrations by electrical and plumbing components. SPS 321.08(3)(b) reads as such:

Electrical and plumbing components. Penetrations of a required separation by electrical and plumbing

components shall be firmly packed with noncombustible material or shall be protected with a listed through-penetration firestop system with a rating of at least one hour.

52) Our city is redoing a section of a street this summer. During construction, they are going to remove the metal water main and the copper water services going to the houses on that street and replace them with PVC. Some houses on that street have older electric services and might have only one ground rod, if any at all. The copper water service is their only supplemental ground. Would the city be required to hire an electrical contractor and install ground rods at these houses?

Code reference: NEC 250.50

Answer: Our staff consensus is that an unsafe condition is created by removing the copper water services thus eliminating the primary grounding electrode to the homes in question. SPS 316.003 requires compliance with State and National electrical codes when alterations are made at a dwelling. We consider this an alteration of the grounding electrode system. SPS 316.003.(3) requires installations be brought into compliance when a hazard to life, health or property is created by the installation or alteration. Removing the grounding means such as the water pipe electrode connection creates a hazard to life and property. Installation of two ground rods as required in SPS 316.250(2) or other electrodes specified in NEC 250.52(A)(4)-(A)(8) shall be installed at each home effected by the alteration of water service to PVC. If a home affected has ground rod/s installed already, the rods and connections shall be inspected so as to determine if the grounding has been properly maintained. If an inspection cannot determine the condition of the existing rod/s & connections, a new installation shall be required. Our staff does not determine who is responsible to hire an electrical contractor to install the ground rods at the homes affected.

53) Can a registered electrician work under a journeyman?

Code reference: SPS 305(40)(5)

Answer: Yes. SPS 305(40)(5) Reads:

At any time, for any electrical wiring project, the total number of registered beginning electricians at an installation site may not exceed twice the total number of licensed or registered master electricians and journeyman electricians at the installation site plus two.

54) Can a range hood be wired with a cord (such as a disposal cord) and plugged into a receptacle in the cabinet it is mounted on? We have been doing this for a while but an inspector said it is illegal. Also he told us that a disposal and dishwasher can't be cord connected unless they come from the factory with a cord.

Code reference: NEC 422.16(B)(4)

Answer: No, the inspector is not correct. Refer to NEC 422.16(B)(4)

55) I have a question regarding a furnace on a new construction residential job. The nameplate on the furnace has a FLA of 12.8 amps, the inspector is stating that I have to take 125% of the nameplate, which would make this a 20 amp circuit. Is he correct?

Code reference: NEC 422.10(A)

Answer: No. 422.10(A) requires that the rating of the branch circuit is not be less than the marked rating of the appliance. It would be allowable to supply the furnace with a 15 ampere branch circuit with 14 AWG conductors. We do not consider furnaces to be a continuous load.

56) We are having a dispute regarding this section of the code. We are working on a house in which we are helping to install a new bathroom on the second floor and remodel the bathroom (drywall off - down to studs) on the first floor. We have two different opinions on the number of 20 amp branch circuits needed for receptacle outlets. One opinion is that each bathroom needs its own 20 amp circuit and the other opinion is that one 20 amp circuit can feed the outlets in both bathrooms. The attached reference refers to multiple receptacles being on the same circuit. But this doesn't state specifically that they can be in separate bathrooms. It appears this allows for multiple receptacles in one bathroom to be on the same 20 amp circuit. Would you please resolve our conflict?

Code reference:

Answer: One 20 ampere circuit can be used to supply the receptacle outlets in multiple bathrooms. The language does not limit the circuit to a single bathroom. A 20 ampere branch circuit would be limited to a single bathroom only when loads other than receptacle outlets are supplied by that circuit.

57) I have a contractor that is questioning my interpretation of NEC 300.5(B). The rating of wires they want to use is Romex and standard CAT5e. Would it be allowed to use wires/cables that are not listed for damp/ wet locations under a building within the footings?

Code reference: NEC 300.5 (B), 800.110(A) (1)

Answer: No for NM Romex. Yes for CAT5e. You are correct. Areas under a building are considered a wet location according to NEC 300.5 (B). NM cable would not be allowed. CAT5e would be allowed in the raceway per NEC 800.154. Communication wires and cables shall be permitted to be installed in any raceway included in Chapter 3 according to NEC 800.110(A) (1). Table 800.154 (a) gives more information on where cables can be used.

58) On my last inspection of the day I was approached by the electrician on the job, who had an interesting issue for me. He just recently attended a continuing educational seminar. The presenter discussed State Statute 101.86 and how it relates to local municipalities and ordinances. In our ordinance we have, for some time, a "list" of items that need to be addressed when an electrical service is changed out. The flowing is copied directly from our ordinance:

Upon a service change to every existing dwelling unit, the following minimum requirements shall be met:
a. Supplemental grounding electrodes (2 at 8 feet long, 6 feet apart) per NEC 250.52(A)(1-7) and SPS

316.

b. Check ground clamp to water service per NEC 250.68(b).

c. Install two 20 amp small appliance circuits to kitchen if not existing per NEC 210.52(B)(1).

I have dealt with some resistance to these requirements, but I am a firm believer in what we're looking to achieve with this service change. Since changing the service equipment many times does not take care of the "hot spots" where today's uses exceed yesterday's installations. The electrical contractor told me this "presenter" told the class that if a municipal inspector makes you do things related to your work, then he/she is doing something illegal as this statute precludes municipalities from creating these regulations. I am seeking your assistance to "set me straight" as I will either need to change the way we handle things here, or take issue with this presenter.

Code reference: SS 101.86

Answer: The electrician is correct. The language in SS 101.86(1)(a) was changed by 2015 Act 55. The language now reads that municipalities may enact an electrical code provided the code strictly conforms with the state electrical wiring code. (SPS 324 and SPS 316)

For example, when a service change is done, your municipality may not require GFCI protection for the kitchen receptacles if GFCI protection was not required when they were first installed. We have had discussion with numerous municipalities throughout the state regarding this change in the statute, and the department's legal staff has also reviewed the language and concurs with our assessment. The statute reads:

101.86 Municipal authority.

101.86(1) Municipalities may:

101.86(1)(a) Enact an electrical code or otherwise exercise jurisdiction over electrical wiring and inspection of electrical wiring by enactment of ordinances, provided that the electrical code or ordinance strictly conforms with the state electrical wiring code promulgated by the department under s. 101.82 (1).

59) If I remember correctly, we are no longer required to put a bonding ring around an above ground pool that has composite posts and ring. If the only metal on the pool is the sides why is the inspector asking me to bond the pool? I have nothing to bond to.

Code reference: Parts 1 & 2 of NEC 680, 680.26

Answer: If a listed permanent pool pump is installed, then yes. The following should be helpful to your question on pool bonding. If the pool (defined as portable or permanent) is supplied with a pump listed as a permanent pool pump it shall be wired as a permanent pool (Parts 1 & 2 of NEC 680). What pump exists on your project? If the pump is listed as a permanent pump motor, the pool shall be installed per the bonding requirements in NEC 680.26. We can't mix and match code requirements from parts 2&3 of NEC 680 to our liking. If the pool pump supplied is listed as a storable pool pump (25' cord with integral GFCI) and the pool has an interior vinyl liner, it shall be allowed to be wired in accordance with part 1 & 3 of NEC article 680. No additional bonding is required. This understanding has resolved the issues

with 99% of the pools in question. It really comes down to the pool listing. Some additional information that may assist you is as follows: I think to look at this question you really need to look at the definitions in NEC 680.2 as well as UL Marking and Application Guide for Swimming Pool Equipment, Spas, Fountains and Hydro massage Bathtubs as well as UL Category WCSX for [Swimming Pool and Spa] Pumps. We see that any pool that is designed to hold 42" or less of water, intended for installation above grade and/or has nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimension are clearly considered to be storable pools. We also see that a pool constructed in the ground or partially in the ground, or installed within a building and any other pool capable of holding more than 42" of water would be considered a permanently installed pool. Although this appears straightforward, issues arise when owners and installers mix and match. In other words, they take a pool that is designed to be a storable pool and install it in such a way that it is regarded as a permanently installed pool by definition. When looking at the UL White Book Category WCSX it is clear that pumps designed for permanently installed pools are not to be used with storable pools. It also states that pumps intended for storable pools are not to be used with permanently installed pools. In the UL Marking and Application Guide for Swimming Pool Equipment, Spas, Fountains and Hydromassage Bathtubs, section 1.3 for permanently installed pumps state:

UL Listed pumps include those intended for permanent plumbing for use with permanently installed pools and spas, as well as portable units intended for use with storable pools. A pump with means for permanent wiring connections or a 3-foot flexible cord and plug, suitable for permanently installed pools is marked:

"This Pump is for Use with Permanently Installed Pools Only — Do Not Use with Storable Pools. A permanently installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity."

Only pumps with this marking should be used with permanently installed pools.

Listing Mark. UL Listing Marks with the product names "Swimming Pool Pump," "Spa Pump," or "Swimming Pool or Spa Pump" indicate units suitable for use with swimming pools and spas. A unit for which the name includes "Spa Pump" has also, in addition to the swimming pool pump requirements, been evaluated for use with heated (122°F) water.

Field Installation: Ground-Fault Protection. Cord-and-plug-connected pumps for use with permanent in or above ground pools or spas are intended to be connected to a circuit protected by a GFCI and are so marked. Each unit is provided with the following marking or equivalent: "WARNING — Risk of electric shock. Connect only to a grounding type receptacle protected by a ground- fault circuit interrupter (GFCI)."

Supply Connection. Unless constructed as indicated below, pumps intended for permanent plumbing connection are provided with means for permanent wiring connections.

Pumps intended for permanent plumbing connection and location at a minimum of 6 feet from the inside walls of a pool or spa may be provided with a 3-foot cord terminating in a grounding-type attachment plug that is the locking type.

Pumps intended for permanent plumbing connection and location at least 10 feet from the inside walls of a pool or spa may be provided with a 3-foot power supply cord with an attachment plug that is not the locking type. These units are marked "CAUTION — To reduce the risk of electric shock, install at least 10 feet from the inside walls of a pool. Do not use an extension cord."

Pumps supplied with a minimum 25-foot cord and attachment plug are intended for use with storable pools only and are so marked. These pumps are not suitable for permanently installed pools (in-ground and aboveground non-storable).

In the UL Marking and Application Guide for Swimming Pool Equipment, Spas, Fountains and Hydromassage Bathtubs, section 3.3 addresses pumps for use with storable pools and it states:

Listing Mark. Pumps suitable for this application have a Listing Mark with the product name "Swimming Pool Pump" or "Swimming Pool Pump or Spa Pump."

Storable Pools Only. The type of pump suitable for use with storable pools has a 25-foot flexible cord and attachment plug. It is marked:

"This Pump is for Use with Storable Pools Only — Do Not Use with Permanently Installed Pools. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity. A permanently installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage.

Field Installation: Double Insulation. Pumps with a minimum 25-foot supply cord are double insulated and have inaccessible metal parts grounded with the equipment-grounding conductor terminated at the attachment plug. These pumps do not have a bonding connector. They are not intended to be connected to an equipotential bonding grid.

Ground-Fault Protection. Pumps for storable swimming pools are provided with a factory installed Class A ground-fault circuit-interrupter. It is an integral part of the attachment plug or in the supply cord within 12 inches of the attachment plug.

In conclusion, improper application of swimming pool components are not unlike the improper application of other electrical equipment such as LED lighting and LED drivers.

60) I have a new home that has an 8 foot island that is divided by a kitchen sink. My interpretation of 210.52(C) (4) is the sink divides the counter top and 2 outlets are required. The contractor contests if one side of the island is more than 12" deep (seating side) it only requires 1 outlet for the island. Please advise.

Code reference: NEC 210.52(C)(4)

Answer: The contractor is correct. If one side of the island is more than 12" deep (seating side) it only requires 1 outlet for the island. NEC 210.52(C)(4) permits the installation.

61) New single family construction that has rebar in the footing. The floor got poured and apparently someone bent the rebar back under the floor. No attachment available without hammering out some floor until some rebar is found. Does someone need to bust out the floor until an attachment can be made or can the electrician install ground rods outside per code and have that be sufficient? I think I know the answer that if the rebar is there in the required length, it must be attached to, but I told the general contractor I would check to get an official answer.

Code reference: NEC 250.52(A)(3)(2)

Answer: Yes. You are correct if a concrete encased electrode is available then it must be used. This is a new construction, and the concrete encased electrode exists, and should be attached to the grounding electrode system. In cases where there is a concrete encased electrode present, but not connected, it is allowable to install another concrete encased electrode since the last sentence of 250.52(A)(3)(2) states that where more than one concrete encased electrode is present it shall be permissible to bond only one into the grounding electrode system. They can dig down besides the footing and add a ufer ground that would consist of at least 20' of rebar ½" in diameter or larger and encased in at least 2" of concrete.